

the margin.—Swamps near Coban, Alta Vera Paz, alt. 4,300 feet, September, 1885. (Pl. Guat. Tuerck., a I. D. S. edit., 704.)

**NEPHRODIUM FENDLERI**, Hook., var. **PAUCIPINNATUM**.—Rhizome short, thick, erect; scales matted, blackish, lanceolate, 4-5 lines long, cells punctiform; rootlets with a heavy brown tomentum: stipes few in the crown, scaly at base, smooth, stramineous, 2 feet long, thick as a crow's quill: frond about as long as stipe, quite smooth throughout, minutely bullate-punctate; pinnæ 8-14, not in pairs, 8-10 inches long, 15-20 lines broad, terminal one distinct and not larger than the lateral, caudate entire apex 2 inches long, cut almost half-way to the rachis into 20-24 lobes; veinlets 10-12-jugate, only two or three from adjoining groups uniting at or below the sinus: sori on each veinlet, those above the sinus marginal; indusium pallid, not corrugate, reniform, center depressed, sinus open.—Prof. Eaton has examined this fern, and advises that it comes very close to his *Aspidium Fendleri* (Mem. Ac. Sc. viii. 210), but has fewer pinnæ. In that respect as well as others the numerous specimens are uniform.—Rock-crevices in Petet, near Coban, alt. 4,300 feet, September, 1885; copses, Pansamala, alt. 3,800 feet, July, 1886. (Pl. Guat. Tuerck., a I. D. S. edit., 767, 667.)

### Notes on Umbelliferae of E. United States. V.

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(WITH PLATE V.)

[In addition to the collections mentioned in the April GAZETTE, we have now to add those belonging to Brown University. Prof. W. W. Bailey has thus kindly put at our disposal, not only his own large collection of Umbelliferae, but also those of Olney and Bennett.]

**THASPIUM** Nutt.—Fruit ovoid to oblong, slightly flattened dorsally: carpel with 5 primary ribs, 3 or 4 or all of them strongly winged: oil-ducts solitary in the intervals, two on the commissural side: seed-section round or somewhat dorsally flattened, indented beneath the oil-ducts: stylopodium wanting; styles long (figs. 57-62).—Perennials (2 to 5 ft. high), with ternately divided leaves and broad serrate or toothed leaflets (or lower leaves simple), mostly yellow flowers, and all the fruit pedicelled.—The species of *Thaspium* are in great confusion. In Gray's Manual *T. aureum* Nutt. and

*T. trifoliatum* Gray each have an apterous variety. These apterous forms were taken from Koch's genus *Zizia* and placed under the *Thaspium* species apparently from the close resemblance of the foliage. The fruit characters, however, are abundantly distinct, for the *Zizia* forms have simply ribbed fruit flattened laterally, the central fruit of the umbellets sessile, and flower early in spring; while *T. aureum* and *T. trifoliatum* of the Manual have winged fruit flattened dorsally, central fruit pedicelled, and flower late in summer, maturing fruit in the fall. Bentham and Hooker have transferred these apterous *Zizia* forms to a section *Zizia* under *Carum*, from which genus they differ in the absence of stylopodia, central sessile fruit, more prominent ribs, and *Thaspium*-like foliage. The same authors seem to have made no disposition of *T. aureum* of the Manual, unless it went with the apterous variety, while the group of forms under *T. trifoliatum* Gray of the Manual has been taken as representing *T. cordatum* Torr. & Gray. For this latter species Bentham and Hooker seem to have had in mind only Gray's apterous variety, and so referred it to *Carum* § *Zizia* as one of the two species. In Watson's Bibliographical Index the synonym *Carum cordatum* Benth. & Hook., under *T. trifoliatum*, is correctly quoted, so far as literature is concerned, but apparently should be transferred to *T. trifoliatum*, var. *apterum* Gray, to express the real form Bentham and Hooker had in mind. This leaves the Manual forms *T. aureum* and *T. trifoliatum* with its var. *atropurpureum* unprovided for by these authors, the two apterous varieties only having been used to form the section *Zizia* under *Carum*. An explanation of this may be found in the fact that most of the herbarium specimens labeled *Thaspium aureum* and *T. trifoliatum* are really the so-called apterous varieties. The specific forms with winged fruit are quite uncommon among herbarium specimens, while the apterous forms are very abundant.

1. ***T. aureum*** Nutt. *Genera*, i. 196. Glabrous: root-leaves mostly cordate, serrate; stem-leaves simply ternate (rarely biternate); leaflets ovate to lanceolate, round or tapering at base, serrate: flowers deep yellow: fruit globose-ovoid, about 2 lines long, all the ribs equally winged (figs. 57, 58).—Thickets and woodlands, as far west as Illinois. Flowering in summer and maturing fruit in late summer or autumn. This species has a wide range of variation in the division and toothing of its leaves, but they are so inconstant that it seems impossible to found specific distinctions upon them.

In characterizing *T. aureum*, Nuttall has laid some stress upon "lateral divisions of the upper leaves subsessile," a character which means nothing, as these divisions may be sessile, subsessile, or petioled on the same plant, either in *T. aureum* or the *T. trifoliatum* of Gray. So far as foliage characters are concerned, serrate leaflets point to Nuttall's form, while crenately toothed leaflets stand for Gray's *T. trifoliatum*, exclusive of his vars. *apterum* and *atropurpureum*.

Further confusion in leaf characters has arisen by including the so-called apterous varieties, which we have transferred to *Zizia*. An extreme variation in leaf characters, but merging completely into the type through intermediate forms, is presented by

Var. **trifoliatum**, in which all the leaves or leaflets are crenate or crenately toothed. *T. trifoliatum* Gray, Manual, 195, in part.—Ohio to Illinois and westward to Oregon. This seems to be the common western form of the species, as our Pacific coast specimens are all distinctly var. *trifoliatum*. From Ohio to Illinois there is an interminable intermixing of the species and the variety, while in Pennsylvania the specific form is well represented.

Var. **atropurpureum**. Petals dark-purple. *T. atropurpureum* Nutt. *T. trifoliatum* var. *atropurpureum* Gray, Manual.—With the preceding forms. This variety has the leaf characters of the species, and if var. *trifoliatum* had been retained as a species, var. *atropurpureum* would have been transferred to *T. aureum*.

In giving the range of the above group of forms it has been impossible to use published ranges owing to the great confusion as to what forms were intended. Discarding the apterous varieties, the true *Thaspiums* of this group are but scantily represented in our herbaria, far more so, probably, than their occurrence would justify. The early spring and summer flowers and fruits of the apterous forms have probably too often satisfied collectors that they had already secured good material of forms which only appeared in collecting condition in late summer and autumn. Therefore we could only cite such range as our material indicated, confident at the same time that it could not represent the whole range. We would call the attention of collectors to this point, that the true range of *T. aureum* and its var. *trifoliatum* may be obtained.

2. **T. barbinode** Nutt. Genera, i. 196. Loosely branched, pubescent on the joints, sometimes puberulent in the umbels:

leaves 1 to 3-ternate; leaflets ovate to lanceolate, acute, with cuneate base, coarsely cut-serrate, often ternately cleft or parted: flowers light yellow: fruit broadly oblong, about 3 lines long and 2 lines broad, with mostly 7 ribs prominently winged, the other three not at all winged or but slightly so (figs. 59, 60).—Banks of streams, New York to Minnesota and southward. Fl. May and June.

✓ Var. *angustifolia* has narrower, more sharply cut leaflets, and is readily distinguished from the type.—Marion Co., Illinois (*Bebb*), Westmoreland Co., Pennsylvania (*W. W. Bailey*), Montgomery Co., Indiana (*Rose*).

3. *T. Walteri* Shuttlew. Loosely branched, pubescent on the joints, puberulent on branchlets, umbels, and fruit, with fewer leaves: leaves 1 to 3-ternate; leaflets 1 to 2-pinnatifid, lobes linear or oblong, one or two leaves near the base often very large and long petioled (petioles sometimes a foot long): flowers light yellow: fruit oblong,  $1\frac{1}{2}$  to  $2\frac{1}{2}$  lines long and 1 to  $1\frac{1}{2}$  lines broad, all the ribs winged, generally three of them narrowly so (figs. 61, 62). *T. pinnatifidum* Gray, Manual.—Barrens and mountains, North Carolina to Kentucky.

**ZIZIA**<sup>1</sup> Koch.—Fruit ovate to oblong, flattened laterally: carpel with 5 primary ribs (not at all winged): oil-ducts large, solitary in the intervals, two on the commissural side, and a small one in each rib: seed-section round, indented beneath the oil-ducts: stylopodium wanting; styles long (figs. 63–66).—Smooth perennials (1 to 3 ft. high), with mostly *Thaspium*-like leaves, yellow flowers, and central fruit of each umbellet sessile (in ours). Flowers in early spring, in open prairies and upland meadows.

In separating the species of *Zizia* from the *Thaspium aureum* group we are very much indebted to Mr. M. S. Bebb, who has placed the careful observations of ten years at our disposal, and who is convinced that they are abundantly distinct. His field observations concerning their decided differences in habitat and time of blooming very strongly confirm the differences discovered in fruit structure.<sup>2</sup>

1. *Z. aurea* Koch, Umbel. 129. Radical leaves very long-petioled, all but the uppermost leaves 2–3-ternate; leaflets ovate to lanceolate, sharply serrate: rays 15 to 25, stout, 1 or

<sup>1</sup> It must be remembered that the *Zizia* of Gray's Manual is a *Pimpinella*.

<sup>2</sup> The western species that has been variously called *Seseli Hallii*, *Musenium Greenei*, and *Carum* (?) *Hallii* is evidently a *Zizia*. Its fruit characters are identical with those of *Zizia*, and had Koch's genus been retained it would probably have already included this species as *Zizia Hallii*.

2 inches long: fruit oblong, about 2 lines long (figs. 63, 64). *Thaspium aureum* Nutt., var. *apterum* Gray, Manual, 195. *Carum aureum* Benth. & Hook. Gen. Pl. i. 891.—Throughout our range, extending westward as far as the Saskatchewan and Texas.—Although *Thaspium aureum*, var. *apterum* is the real synonym of this species, botanists will find in their herbaria many specimens of *Zizia aurea* labeled *Thaspium aureum* and *Thaspium trifoliatum*.

Var. *Bebbij*. A more slender, mountain form, with leaflets more coarsely serrate or even toothed, the radical leaves smaller and more simple: rays 2 to 8, slender, 2 or 3 inches long: fruit mostly smaller, oval, 1 to 1½ lines long.—Virginia and North Carolina. Collected by *Curtiss* (1868), *Canby* (1876), *Meehan*, *Porter*, *Leidy* and *Willcox* (1880).

2. *Z. cordata* Koch, Umbel. 129. Radical leaves mostly long-petioled, cordate or even rounder, crenately toothed, very rarely lobed or divided; stem-leaves simply ternate or quinate, ovate to lanceolate, simply serrate, incised, or even parted: fruit ovate, 1½ lines long; seed-section larger than in the last (figs. 65, 66). *Thaspium trifoliatum*, var. *apterum* Gray, Manual, 195. *Carum cordatum* Benth. & Hook. Gen. Pl. i. 891.—Same range as last and extending to Oregon. As in the last species, herbarium specimens of *Zizia cordata* will be found labeled almost anything under the *Thaspium aureum* section.

CARUM L.—Fruit ovate to oblong, flattened laterally: carpel with 5 primary ribs: oil-ducts large, solitary in the intervals, 2 to 6 on the commissural side, none in the ribs: seed-section dorsally flattened, more or less indented beneath the oil-ducts: stylopodium conical (figs. 67, 68).—The American species are western, with tuberous or fusiform roots, simply pinnate leaves with linear leaflets, and white flowers. The common garden caraway from Europe seems to have become naturalized in many places, and is

1. *C. Carui* L., with pinnately compound leaves and filiform divisions.—Apparently more commonly naturalized to the north and northwest.

EXPLANATION OF PLATE V.—Fig. 57, fruit of *Thaspium aureum*; fig. 58, section of carpel of same; fig. 59, fruit of *T. barbinode*; fig. 60, section of fruit of same; fig. 61, fruit of *T. Walteri*; fig. 62, section of fruit of same; fig. 63, fruit of *Zizia aurea*; fig. 64, section of carpel of same; fig. 65, fruit of *Z. cordata*; fig. 66, section of carpel of same; fig. 67, fruit of *Carum Carui*; fig. 68, section of carpel of same. All surface views are  $\times 7$ ; transverse sections  $\times 22$ .